CLAIMS

1.   In combination:

detector means for receiving a first signal which
travels along a first propagation path and a second
signal which travels along a second propagation path, a

5   portion of said first and second propagation paths being
located in the same propagation medium, wherein said first
signal has a primary signal portion and a secondary signal
portion and said second signal has a primary signal portion
and a secondary signal portion; and

10   first signal processor means having input means for
receiving said first and second signals and combining said
first and second signals for generating either a primary or
secondary reference signal having a significant component
which is a function of either of, respectively, said primary

15   or said secondary signal portions of said first and second
signals.

2.   The combination recited in claim 1, further
comprising second signal processor means for receiving said
secondary reference signal and said first signal and for
deriving therefrom an output signal having a significant

5   component which is a function of said primary signal portion
of said first signal.

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3.   The combination recited in claim 2, wherein said
second signal processor means includes a correlation
canceler.

4.   The combination recited in claim 2, wherein said
second signal processor means includes an adaptive noise
canceler.

5.   The combination recited in claim 4, wherein said
adaptive noise canceler includes a joint process estimator.

6.   The combination recited in claim 5, wherein said
joint process estimator comprises a least-squares lattice
predictor and a regression filter.

7.   The combination recited in claim 1, further
comprising second signal processor means for receiving
said primary reference signal and said first signal and for
deriving therefrom an output signal having a significant
component which is a function of said secondary signal
portion of said first signal.

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8.   The combination recited in claim 1, further
comprising second signal processor means for receiving said
secondary reference signal and said first signal and for
deriving therefrom an output signal having a significant
5   component which is a function of said primary signal portion
of said second signal.

9.   The combination recited in claim 1, further
comprising second signal processor means for receiving
said primary reference signal and said first signal and for
deriving therefrom an output signal having a significant
5   component which is a function of said secondary signal
portion of said second signal.

10.   The combination recited in claim 1, wherein said
detector means includes a sensor for sensing a physiological
function depending upon said first and second signals.

11.   The combination recited in claim 10, wherein said
sensor is adapted to measure a blood constituent.

12.   The combination recited in claim 11, wherein the
blood constituent measured by said sensor is blood gas.

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13. The combination recited in claim 10, wherein said sensor includes a device that is responsive to electromagnetic energy.

14. The combination recited in claim 1, further comprising electromagnetic means connected to said detector means for measuring a plethysmographic waveform depending upon said first and second signals
5   received by said detector means through said propagation medium, said propagation medium including living tissue.

15. The combination recited in claim 1, further comprising pulse oximeter means connected to said detector means for measuring a physiological condition depending upon said first and second signals received
5   by said detector means through said propagation medium, said propagation medium including living tissue.

16. The combination recited in claim 1, further comprising blood pressure monitoring means connected to said detector means for measuring a physiological condition depending upon said first and second signals
5   received by said detector means through said propagation medium, said propagation medium including living tissue.

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17. The combination recited in claim 1, further comprising electrocardiogram means connected to said detector means for measuring a physiological condition depending upon said first and second signals received

5 by said detector means through said propagation medium, said propagation medium including living tissue.

18. The combination recited in claim 17, wherein said electrocardiogram means for measuring a physiological condition includes a tripolar electrode sensor having three concentrically arranged electrodes.

19. Apparatus for indicating the constituency of a material, said apparatus comprising:

first signal processor means for receiving first and second inputs, the first input comprising one of a

5 plurality of reference signals, each of said plurality of reference signals being related to the second input;

means for applying said second input and each of said plurality of reference signals to said first signal processor means; and

10 means for detecting the output signals of said first signal processor means for each of said plurality of reference signals applied to said signal processor means, wherein said output signals are indicative of the constituency of said material.

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20.   The apparatus recited in claim 19, wherein said first signal processor means is a correlation canceler.

21.   The apparatus recited in claim 19, wherein said first signal processor means is an adaptive noise canceler.

22.   The apparatus recited in claim 21, wherein said adaptive noise canceler comprises a joint process estimator.

23.   The apparatus recited in claim 22, wherein said joint process estimator comprises a least-squares lattice predictor and a regression filter.

24.   The apparatus recited in claim 19, further comprising second signal processor means receiving each of the output signals of said first signal processor means, said second signal processor means integrating each of said output signals for forming a cumulative output signal which is indicative of said integrated output signals.

25.   The apparatus recited in claim 24, wherein said detecting means is responsive to the extremum of said cumulative output signal of said second signal processor means for providing an indication of the constituency of the material.

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26. The apparatus recited in claim 24, wherein said detecting means is responsive to the inflections of said cumulative output signal of said second signal processor means for providing an indication of the constituency of the
5   material.

27. The apparatus recited in claim 19, wherein said second input applied to said first signal processor means is one of a first or a second signal, each of said first and second signals having an arterial signal portion and another signal portion that is indicative of venous blood, and further comprising second signal processor means for receiving said first and second signals and a plurality of signal coefficients, wherein the output of said second signal processor means forms said first input applied to
10   said first signal processor means, the output of said second signal processor means including a first component which is related to the arterial signal portions of said first and second signals and a second component which is related to the other signal portions of said first and second signals.

28. The apparatus recited in claim 27, wherein the other signal portion of each of said first and second signals includes an indication of human respiration.

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29.   The apparatus recited in claim 27, wherein at
least one of said plurality of signal coefficients received
by said second signal processor means relates to the
arterial signal portions of said first and second signals of
said second input to said first signal processor.

30.   The apparatus recited in claim 27, wherein at
least one of said plurality of signal coefficients received
by said second signal processor means relates to the other
signal portions of said first and second signals of said
second input to said first signal processor means.

31.   The apparatus recited in claim 19, wherein said
second input applied to said first signal processor means is
one of a first or a second signal, each of said first and
second signals having an arterial signal portion and another
signal portion that is indicative of venous blood, and
further comprising second signal processor means for
receiving said first and second signals and a plurality
of signal coefficients, wherein the output of said second
signal processor means forms said first input applied to
said first signal processor means, the output of said second
signal processor means including a component which is
related to the arterial signal portions of said first and
second signals or a component which is related to the other
signal portions of said first and second signals.

32. The apparatus recited in claim 31, wherein the other signal portion of each of said first and second signals includes an indication of human respiration.

33. The apparatus recited in claim 19, wherein said material is human tissue.

34. The apparatus recited in claim 19, wherein said detecting means is responsive to the power of the output signals of said first signal processor means for indicating the constituency of said material.

35. Apparatus for computing arterial and venous signals in living tissue, said apparatus comprising:

detector means for receiving a first signal which travels along a first propagation path and a second signal which travels along a second propagation path, a portion of said first and second propagation paths being located in a propagation medium, wherein said first signal has an arterial signal portion that is indicative of arterial blood and another signal portion that is indicative of venous blood, and said second signal has an arterial signal portion that is indicative of arterial blood and another signal portion that is indicative of venous blood; and

signal processor means having input means for receiving said first and second signals and combining said first and

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second signals to generate a signal having a significant
component which is a function of either of said arterial or
said other signal portions of said first and second signal.

36.   The apparatus recited in claim 35, wherein the
other signal portion of each of said first and second
signals includes an indication of human respiration.

37.   Apparatus for computing arterial and venous blood
constituent values in living tissue, said apparatus
comprising:

signal processor means for receiving first and second

5   inputs, a first of said inputs comprising one of a plurality
of reference signals, each of said plurality of reference
signals being related to the second input;

means for applying said second input and each of said
plurality of reference signals of said first input to said

10   signal processor means; and

means for detecting the power of the output signals of
said signal processor means for each of said plurality of
reference signals of said first input, wherein said power is
indicative of said arterial and venous blood constituent

15   values.

38. The apparatus recited in claim 37, wherein said arterial and venous blood constituent values are the oxygen saturation of arterial and venous blood, respectively.

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